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ABSTRACT

This paper discusses the development of new curricula, materials, and equipment in Japan. The first section, "The Development of New Curricula," discusses the National Curriculum Council and the improvement of the content of instruction, including basic directions for improvement, the structure and content of school subjects, and the improvement of systems. The second section, "Development of Materials," relates to both the needs of schools for material development, and the funding of such developments. The third section, "Equipment," presents the Science Education Promotion Law, which was established in 1953 to support the purchase of science education experimental materials and equipment for elementary, middle, and high schools. Included are tables listing instruments needed for students with various handicapping conditions to study science topics in the elementary and secondary schools. In addition, some data is presented regarding the frequency of the use of observations and experiments in teaching biology, chemistry, physics, and earth science. (TW)

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EXPECTED STYLE OF NEW CURRICULUM DEVELOPMENT IN JAPAN--PROVISIONS OF GOOD SETTING, DEVELOPMENT OF MATERIALS AND EQUIPMENT

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Expected Style of New Curriculum Development in Japan--Provisions of Good Setting, Development of Materials and Equipment

Tomosuke Terakawa

The topics discussed in this paper include the development of (1) new curricula, (2) materials, and (3) equipment.

A. Development of New Curricula

1. The Development of New Curricula and the National Council

It is well known in the Japanese Educational System that the Minister of Education commonly asks the Curriculum Council about the direction of the expected style of New Curriculum Development, and based on the responses made by the Education Council, the Course of Study is produced. In nature, curriculum preparation should be made as an activity of individual schools. However, since the school curricula in Japan are mainly based on the Course of Study presented by the Ministry of Education, the phenomenon of the school education acquired by learners throughout the country is fundamentally similar and the quality of education is inevitably the same in all schools.

Furthermore, Prime Minister Nakasone has made a very enthusiastic effort to foster educational innovations thereby making the necessity of setting up a National Council to discuss the new scheme of Japanese education in the future. From now on, Japanese education will take the direction of the suggestions made by the National Council. Therefore, when we consider the production of a new curriculum in the future, it is necessary for us to consider the policies made by the Council regarding the direction of education.

On September 5, 1984 the Prime Minister asked the Council to advise him on "basic strategies for necessary reforms with regard to government policies and measures in various sectors, so as to secure such education as will be compatible with the social changes and cultural developments of our countries." In response to this request, the Council immediately started its deliberations.

The Council considered it an essential prerequesite to maintain a long-term perspective in considering various issues and problems relating to educational reform. However, considering the urgency of the demands, as well as the current state of affairs in

education, the Council gave priority to a certain number of problems which had to be dealt with immediately. These problems have been examined in conjunction with other long-term issues. On June 26, 1985 the Council submitted to the Prime Minister its "First Report on Educational Reform."

In this report, the Council identified eight basic principles for educational reform: the putting of emphasis on individuality; emphasis on fundamentals; cultivation of creativity, thinking ability and power of expression; expansion of opportunities for choices; humanization of the educational environment; transition to a lifelong learning system; coping with internationalization; and coping with the information age.

In the light of these basic concepts, the Council identified the major issues to be considered during the course of its deliberations for three years. These issues are:

a) Basic requirements for an education relevant to the 21st century,

b) Organization and systematization of lifelong learning and the correction of the adverse effects of undue emphasis placed on the educational background of individuals,

c) Enhancement of higher education and individualization of higher education institutions,

d) Enrichment and diversification of elementary and secondary education,

e) Improvement in the quality of teachers,

f) Coping with internationalization,

g) Coping with the information age,

h) Review of educational administration and finance.

After the submission of its first report, the Council continued its deliberations regarding the major issues defined in the first report, taking account of the requests and comments expressed by all segments of society. In April 1986 the Council submitted its "Second Report on Educational Reform" to the Prime Minister.

The report is composed of four parts listed below:

Part 1--Basic direction of education for the 21st Century.

Part 2--Reforms to invigorate education and inspire public confidence.

Part 3-- Reforms for coping with the changes of the times.

Part 4--Basic direction for reform of educational administration and finance.

Part two of this report, which deals with the reforms to invigorate education and inspire public confidence, contains in its third chapter on the "Reform of Elementary and Secondary Education" topics which are related to this paper.

This third chapter consists of 4 sections which are stated as follows. Section 2 deals with topics related to the improvement of the content of instruction. I brought out section 2 here because I would like to give a brief review of its contents.

Section 1--Enrichment of moral education

Section 2--Improvement of contents of instruction

Section 3--Improvement of the quality of teachers

Section 4--Improvement of the environmental factors affecting education

2. The Improvement of Content of Instruction

The whole system of the elementary and secondary education in Japan is discussed because it is necessary to understand fully about science education.

1) The basic direction for the improvement of contents of instruction

In elementary and secondary education, children should acquire the basic and essential knowledge and skills necessary for cultivating sound character formation for life. In our changing and developing society, children should also be assisted in developing the competency for self education, which comprises the will, attitude and ability to learn voluntarily and independently. In addition, attention should be paid to the diversification of the content and methods of

instruction, as much as possible.

a. Concentration of the content of instruction on the essentials should be attempted at all levels--elementary, lower secondary and upper secondary. The amount and level of difficulty of what is taught should be reviewed to ascertain whether it is appropriate for children at each respective school level. Based on this review, more effort should be made to select the essential subjects.

In this effort, emphasis should be placed on the following: developing creativity, the ability to think clearly, judgment and the power of expression; giving children a deeper understanding of the tradition and culture of Japan and the development of an awareness of themselves as Japanese citizens; improving their physical fitness and upgrading health sciences education; fostering children's ability to act independently, a skill necessary in which is growing more international and to cope with the information technology is speading.

At the elementary school level, in particular, stress should be placed on enabling children to master the basic skills of reading, writing and arithmetic and to develop good social attitudes and aesthetic sensibilities.

b. At the secondary school level, efforts should be made to diversify the content of what is taught, putting value on the development of distinctive personalities. To this end, the kinds of required and elective subjects, as well as the nature and content of both general and vocational education, should be reexamined.

Career guidance services should be improved so that students may consider their own future careers and achieve self-realization.

c. Teaching methods should be diversified and evaluation practices improve so that students receive instruction appropriate to their individual characteristics and thereby develop sound and balanced personalities.

d. In order to make school activities more open to the public, students should be provided with an opportunity to participate in community activities and volunteer services. Upper secondary schools should expand collaborative programs for vocational education with industrial firms, special training schools or other establishments. Upper secondary schools should also provide people in the community

with more opportunities to learn at these schools.

2) The structure and content of school subjects and other school activities.

The structure and content of school subjects and other school activities should be reviewed in the light of the basic direction described above (1). It is also necessary to take into account the developmental stage of children, the continuity of education and the systematization of the content of instruction.

a. Some integration of the existing subjects should be implemented for the lower grades of the elementary school.

b. Examination of the structure and content of courses in social studies at secondary schools should be made. The content of homemaking courses, as well as the nature of this subject (e.g. what part should be required for all students) should also be reviewed.

c. In order to enhance health education the nature and content of courses in moral instruction, special activities, and health and physical education and other related subjects should be examined.

3) The Improvement of the practical application of statutory and other systems affecting the content of instruction.

It is necessary that laws and regulations affecting the content of what is taught at school be made as flexible as possible, so that schools may organize appropriate curricula compatible with the changes and developments in society, the actual circumstances of each school and community, and the developmental stage as well as the diverse personalities of students. This way a sound continuity in the content of instruction may be secured between the different school levels.

a. Regarding the Courses of Study for elementary, lower secondary and upper secondary schools as prescribed by the national government, the provisions therein should be made broader, so that individual schools may employ diverse creative devices in organizing their own curricula. Depending on the nature of the respective subjects, attention should be given to both defining more clearly the basic and essential subject matter and to enriching the description of what comprises each subject. With regard to the organization of the curriculum at individual schools, consideration should be given to providing schools with more

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choices, as well as to allowing some of them to adopt exceptional practices.

b. In connection with what is to be taught, consideration should be given to the possibility of defining the duration of an upper secondary school course and including more flexibly--specifically in terms of "three years of more." In addition, the advantages of the credit system should be utilized.

c. Effort should be made to ensure better continuity and cooperation between the different school levels. In the selection of university entrants, favorable consideration should be given to graduates from vocational courses at upper secondary schools.

Based on the policies stated above, the Ministry of Education, Science and Culture of Japan embodies these policies and these will be reflected on the Course of Study and the Japanese school education based on the New Course of Study.

The lesson plan in each school is generally based on the school curriculum developed by each school. But since the school curriculum is developed according to the Course of Study, all school curricula are developed on the different principles from the Courses of Study in Japan. In the case where the education is based on a different curriculum than the Course of Study, the permission of the Ministry of Education should be required. For this reason, in Japan there are few active activities of unique curriculum development which differ from the Courses of Study. For example, the curriculum development movement which produced such curricula like PSSC, CBA, BSCS, ESCP, etc. during 1960's can not be expected in Japan. Of course, even if some group or organization develops a curriculum with their own ideas it is usually not so popular as to be available.

B. Development of Materials

While curriculum development is not so active, the development of materials is enthusiastically done. (However, these materials developments are limited to the subject field decided by the Courses of Study in order to better attain the goals shown in the Courses of Study).

For example, in the national conference of Japan Science Teaching Society 1985, from among 160 sessions about 60 sessions were related to the development of materials. Furthermore, in the local conference in this same society, the ratio increases. For example, at the Chugoko Local Meeting of Japan Science Teaching Society

in 1985, about 50 percent of the paper sessions were related to the development of science materials.

Almost all the studies made by schools in each prefeture, city, town or village or some educational research groups in science education are related to this area of material development. Material development is provided through the Grant-in-Aid for Scientific Research by the Ministry of Education of Japan. Also, research activities related to the development of materials in the National Institute for Educational Research is popularly done. But even if these products are said to be excellent, if the research is beyond or far from the scope stipulated in Courses of Study, their utilization in schools could not be made available. Also, the development of Audio-Visual materials and the materials that could fit into the Computer Assisted Instructions (CAI) systems are now actively produced. In the future, this field of material development and their utilization could become more popular.

While in Japan the material development task in science education is enthusiastically done, there are big problems related to the method of material development and their utilization in the schools.

In other words, when someone undertakes a study on material development, he may not investigate the previously made studies on materials and in general there is a tendency to study their field using their own ideas. However, even if someone develops an excellent material, the other persons may not refer to these products. This tendency has resulted not only from the fact that they do not investigate the previously undertaken studies on material development, but also from the fact that it is difficult for them to get these published materials. Therefore, in Japan similar kinds of material development are repeatedly done and there are few cummulative effects. These are the big problems that need to be solved.

C. Equipment

In August 1953, the "Science Education Promotion Law" was established which was to support the purchase of science education experimental materials and equipment for the elementary, lower secondary, and upper secondary schools. As a contribution of this law, the sufficiency of science experimental materials and equipment in Japanese schools and the promotion of science education has rapidly improved through this scheme.

The Science Education Promotion Law is stated as follows:

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Under the terms of the Science Education Promotion Law, a national Government subsidy is provided for science education equipment falling under categories of 0, 1, 2, 3 and 4 (0, Scales; 1, Experimental implements and tools; 2, Field Observation and survey tools; 3, Specimens; 4, Models). The specific items and quantities which may be purchased with the national Government subsidy are specified under the Standards for equipment for Science Education. In 1954, the Standards for equipment for Science Education were first instituted, along with the national Government subsidy.

Science Education Promotion Law
Law No. 186: August 8, 1953

General Provisions

(Purpose of the law)

Article 1.

In view of the fact that science education has a role of special importance as the foundation on which to build a cultural state, the purpose of this law shall be to promote science education, in order that pupils may, through science education, acquire scientific knowledge, skills and attitudes, and develop ingenious creative abilities, thereby lead scientific daily life, and may, in accordance with the purpose stipulated in Fundamental Law of Education (Law No. 25 of 1947) and the School Education Law (Law No. 26 of 1947), be brought up into useful members of the national who can contribute to the development of our country.

(Definition)

Article 2.

"Science education" in this law shall mean the education of science in elementary schools (including the elementary department of schools for the blind, the deaf and the otherwise handicapped). Lower secondary schools (including the lower secondary department of schools for the blind, the deaf and the otherwise handicapped) and upper secondary schools (including upper secondary department of schools for the blind, the deaf and otherwise handicapped).

(Responsibilities of the State)

Article 3.

The state shall endeavor to promote science education in accordance with the provisions of this law and other laws and ordinances, and encourage local public bodies to endeavor to promote science education

by those means provided in each of the following.

(1) To draft on overall program for the promotion of science education.

(2) To improve upon the content and methods in science education.

(3) To provide equipment and facilities in science education.

(4) To plan and execute pre-service and in-service education programs for teachers and leaders in science education.

Subsidies from National Treasury

(Subsides from National Treasury)

Article 9.

In the case where the facilities provided in each of the following are below the standard stipulated by government ordinance upon deliberation in the Science and Technical Education Council and the establishers of public or private schools, they are to raise the status up to the standard and the state shall subsidize the establishers, within the fiscal budget, 50 percent of the amount of expenses required for this project.

(1) Facilities for science education in elementary schools and lower and upper secondary schools.

(2) Facilities employed by colleges and universities for the purpose of pre-service and in-service education for teachers and leaders in science education.

2. Expecting the provisions in the preceding clause. The state shall subsidize, within the fiscal budget, the establishers of public or private schools with 50 precent of that amount of the expenses deemed of special necessity to the promotion of science education in public or private schools.

3. In the case where the State subsidizes the school corporation under the provisions in the preceding two clauses, the provisions of Clauses 2 to 6, Article 59 of the Private School Law (Law No. 270 of 1949) shall be applied.

Table 1 Elementary School and Elementary School department of the blind, the deaf and the handicapped.

Measuring Instruments	Length, Volume, Mass, Time Temperature, Electricity
Instruments for Experiments	Force, Motion, Physical Properties, Heat, Light, Sound Magnetism,Electricity, Chemistry Biology, Astronomy Meteorology, Rocks, Minerals
Measuring Instruments for Field	Geological survey, biological collection, preparation of specimens, Thremmatology
Specimens	Rocks, Minerals, Fossil, Plants, Animals
Models	Machinery, Geology, Human anatomy

Table 2 Lower secondary school and lower secondary school department of the blind, the deaf and the handicapped.

Measuring Instruments	Length, Volume, Mass, Time Temperature, Electricity
Instruments for experiments	Force, Motion, Physical properties, Heat, Light, Sound,Magnetism, Electricity, Chemistry,Biology, Astronomy, Miteology,Rocks and Minerals
Measuring instruments for field	Geological survey, Biological collection, Preparation of specimens, Thremmatology
Specimens	Rocks, Minerals, Fossils, Plants, Animal
Models	Machinery, Geology, Minerals, Animal, Human Anatomy

Table 3 Upper secondary school and upper secondary school department of the blind, the deaf, and the handicapped

Measuring instruments	Length, Volume, Mass, Time, Temperature, Electricity
Instruments for experiments	Force, Motion, Physical properties, Heat, Light, Sound, Magnetism, Electricity, Chemistry, Biology, Astronomy, Meteorology, Rocks and Minerals
Measuring instruments for field	Geological survey, Biological collection, Preparation of specimens, Thremmatology
Specimens	Rocks, Minerals, Fossils, Plants, Animals
Models	Machinery (only for the deaf), Geology, Mineralogy, Plant, Animal, Human anatomy

While this Science Education Promotion Law has played an important role in the improvement of Science Education in Japan, there have also been problems which evolved from it. For example: (1) Materials and equipment which are purchased by the support of the national funds are selected and other materials and equipment which are not shown in this law can not be purchased. (2) Since strict checking is imposed in order to keep the materials and equipment in good condition, and avoiding the tendency of their destruction, this means if they are not used, they will not be destroyed. (3) In Japan there is a strong need of preparing for the entrance examination in higher school levels thereby bringing about the phenomenon that as the learners move upward to the higher grade levels their opportunity of performing experiments and observations decreases. This tendency has resulted from the fact that the entrance examination emphasizes the paper-pencil test in assessing the knowledge and understanding possessed by the students.

In this connection, the result of the investigation which attempted to ask the frequency of which observation and experiments in Biology that occurred during the high school years of some college students enrolled at the Faculty of Science of Hiroshima University in April 1985 are shown as follows:

Not at all (never)---------- 5%
2-3 times---------- 72%
4-5 times---------- 11%
6-10 times---------- 10%
More than 10 times---------- 2%

In the subject field of Physics and Chemistry, the ratio of experiences were almost similar. On the other hand, in the field of Earth Science, the experience of observation and the use of equipment has been found to be relatively fewer.

These facts suggest that, even if the science experimental materials and equipment are provided according to the Science Education Promotion Law, their full utilization in actual classroom activities can not be guaranteed. This problem needs immediate attention from educators in order to further improve the teaching of science in schools.